TASK - 1

Importing necessary libraries

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Reading the dataset

In [2]:
```
df=pd.read_csv("worldpopulationdata.csv")
```

In [3]:
```
df.head()
```

Out[3]:

	Series Name	Series Code	Country Name	Country Code	2022	2021	2020	2019	2018	2017	...	
0	Population, total	SP.POP.TOTL	Afghanistan	AFG	41128771.0	40099462.0	38972230.0	37769499.0	36686784.0	35643418.0	...	28
1	Population, total	SP.POP.TOTL	Albania	ALB	2775634.0	2811666.0	2837849.0	2854191.0	2866376.0	2873457.0	...	2
2	Population, total	SP.POP.TOTL	Algeria	DZA	44903225.0	44177969.0	43451666.0	42705368.0	41927007.0	41136546.0	...	35
3	Population, total	SP.POP.TOTL	American Samoa	ASM	44273.0	45035.0	46189.0	47321.0	48424.0	49463.0	...	
4	Population, total	SP.POP.TOTL	Andorra	AND	79824.0	79034.0	77700.0	76343.0	75013.0	73837.0	...	

5 rows × 26 columns

Checking the columns of the dataset

In [4]:
```
df.columns
```

Out[4]:
```
Index(['Series Name', 'Series Code', 'Country Name', 'Country Code', '2022',
       '2021', '2020', '2019', '2018', '2017', '2016', '2015', '2014', '2013',
       '2012', '2011', '2010', '2009', '2008', '2007', '2006', '2005', '2004',
       '2003', '2002', '2001'],
      dtype='object')
```

Some information about the dataset

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1085 entries, 0 to 1084
Data columns (total 26 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Series Name   1085 non-null   object
 1   Series Code   1085 non-null   object
 2   Country Name  1085 non-null   object
 3   Country Code  1085 non-null   object
 4   2022          1085 non-null   float64
 5   2021          1085 non-null   float64
 6   2020          1085 non-null   float64
 7   2019          1085 non-null   float64
 8   2018          1085 non-null   float64
 9   2017          1085 non-null   float64
 10  2016          1085 non-null   float64
 11  2015          1085 non-null   float64
 12  2014          1085 non-null   float64
 13  2013          1085 non-null   float64
 14  2012          1085 non-null   float64
 15  2011          1085 non-null   float64
 16  2010          1085 non-null   float64
 17  2009          1085 non-null   float64
 18  2008          1085 non-null   float64
 19  2007          1085 non-null   float64
 20  2006          1085 non-null   float64
 21  2005          1085 non-null   float64
 22  2004          1085 non-null   float64
 23  2003          1085 non-null   float64
 24  2002          1085 non-null   float64
 25  2001          1085 non-null   float64
dtypes: float64(22), object(4)
memory usage: 220.5+ KB
```

In [6]:
```
df.describe()
```

Out[6]:

	2022	2021	2020	2019	2018	2017	2016	2015	
count	1.085000e+03	1.085000e+03	1.085000e+03	1.085000e+03	1.085000e+03	1.085000e+03	1.085000e+03	1.085000e+03	1.085000
mean	1.461378e+07	1.449711e+07	1.437307e+07	1.422876e+07	1.407966e+07	1.392568e+07	1.376711e+07	1.360705e+07	1.344625
std	7.832944e+07	7.801505e+07	7.763257e+07	7.712985e+07	7.657562e+07	7.596457e+07	7.528760e+07	7.461740e+07	7.394894
min	2.749000e+01	2.732503e+01	2.735104e+01	2.676295e+01	2.573928e+01	2.508394e+01	2.464721e+01	2.474106e+01	2.540718
25%	5.034029e+01	5.035172e+01	5.034171e+01	5.033040e+01	5.033917e+01	5.033041e+01	5.033966e+01	5.033554e+01	5.032504
50%	1.465500e+05	1.463660e+05	1.461650e+05	1.459570e+05	1.457520e+05	1.441350e+05	1.406060e+05	1.371850e+05	1.349620
75%	5.903468e+06	5.856733e+06	5.831404e+06	5.814422e+06	5.774185e+06	5.686999e+06	5.629265e+06	5.544490e+06	5.524552
max	1.417173e+09	1.412360e+09	1.411100e+09	1.407745e+09	1.402760e+09	1.396215e+09	1.387790e+09	1.379860e+09	1.371860

8 rows × 22 columns

Checking for duplicate rows

In [7]:
```
df.duplicated().sum()
```

Out[7]:
```
np.int64(0)
```

Checking for the missing values

In [8]:
```
df.isna().sum()
```

Out[8]:
```
Series Name     0
Series Code     0
Country Name    0
Country Code    0
2022            0
2021            0
2020            0
2019            0
2018            0
2017            0
2016            0
2015            0
2014            0
2013            0
2012            0
2011            0
2010            0
2009            0
2008            0
2007            0
2006            0
2005            0
2004            0
2003            0
2002            0
2001            0
dtype: int64
```

Checking unique values for columns

In [9]:
```
print(df['Country Name'].unique())
print("\nTotal no of unique countries:",df['Country Name'].nunique())
```

```
['Afghanistan' 'Albania' 'Algeria' 'American Samoa' 'Andorra' 'Angola'
 'Antigua and Barbuda' 'Argentina' 'Armenia' 'Aruba' 'Australia' 'Austria'
 'Azerbaijan' 'Bahamas, The' 'Bahrain' 'Bangladesh' 'Barbados' 'Belarus'
 'Belgium' 'Belize' 'Benin' 'Bermuda' 'Bhutan' 'Bolivia'
 'Bosnia and Herzegovina' 'Botswana' 'Brazil' 'British Virgin Islands'
 'Brunei Darussalam' 'Bulgaria' 'Burkina Faso' 'Burundi' 'Cabo Verde'
 'Cambodia' 'Cameroon' 'Canada' 'Cayman Islands'
 'Central African Republic' 'Chad' 'Channel Islands' 'Chile' 'China'
 'Colombia' 'Comoros' 'Congo, Dem. Rep.' 'Congo, Rep.' 'Costa Rica'
 "Cote d'Ivoire" 'Croatia' 'Cuba' 'Curacao' 'Cyprus' 'Czechia' 'Denmark'
 'Djibouti' 'Dominica' 'Dominican Republic' 'Ecuador' 'Egypt, Arab Rep.'
 'El Salvador' 'Equatorial Guinea' 'Eritrea' 'Estonia' 'Eswatini'
 'Ethiopia' 'Faroe Islands' 'Fiji' 'Finland' 'France' 'French Polynesia'
 'Gabon' 'Gambia, The' 'Georgia' 'Germany' 'Ghana' 'Gibraltar' 'Greece'
 'Greenland' 'Grenada' 'Guam' 'Guatemala' 'Guinea' 'Guinea-Bissau'
 'Guyana' 'Haiti' 'Honduras' 'Hong Kong SAR, China' 'Hungary' 'Iceland'
 'India' 'Indonesia' 'Iran, Islamic Rep.' 'Iraq' 'Ireland' 'Isle of Man'
 'Israel' 'Italy' 'Jamaica' 'Japan' 'Jordan' 'Kazakhstan' 'Kenya'
 'Kiribati' "Korea, Dem. People's Rep." 'Korea, Rep.' 'Kosovo' 'Kuwait'
 'Kyrgyz Republic' 'Lao PDR' 'Latvia' 'Lebanon' 'Lesotho' 'Liberia'
 'Libya' 'Liechtenstein' 'Lithuania' 'Luxembourg' 'Macao SAR, China'
 'Madagascar' 'Malawi' 'Malaysia' 'Maldives' 'Mali' 'Malta'
 'Marshall Islands' 'Mauritania' 'Mauritius' 'Mexico'
 'Micronesia, Fed. Sts.' 'Moldova' 'Monaco' 'Mongolia' 'Montenegro'
 'Morocco' 'Mozambique' 'Myanmar' 'Namibia' 'Nauru' 'Nepal' 'Netherlands'
 'New Caledonia' 'New Zealand' 'Nicaragua' 'Niger' 'Nigeria'
 'North Macedonia' 'Northern Mariana Islands' 'Norway' 'Oman' 'Pakistan'
 'Palau' 'Panama' 'Papua New Guinea' 'Paraguay' 'Peru' 'Philippines'
 'Poland' 'Portugal' 'Puerto Rico' 'Qatar' 'Romania' 'Russian Federation'
 'Rwanda' 'Samoa' 'San Marino' 'Sao Tome and Principe' 'Saudi Arabia'
 'Senegal' 'Serbia' 'Seychelles' 'Sierra Leone' 'Singapore'
 'Sint Maarten (Dutch part)' 'Slovak Republic' 'Slovenia'
 'Solomon Islands' 'Somalia' 'South Africa' 'South Sudan' 'Spain'
 'Sri Lanka' 'St. Kitts and Nevis' 'St. Lucia' 'St. Martin (French part)'
 'St. Vincent and the Grenadines' 'Sudan' 'Suriname' 'Sweden'
 'Switzerland' 'Syrian Arab Republic' 'Tajikistan' 'Tanzania' 'Thailand'
 'Timor-Leste' 'Togo' 'Tonga' 'Trinidad and Tobago' 'Tunisia' 'Turkiye'
 'Turkmenistan' 'Turks and Caicos Islands' 'Tuvalu' 'Uganda' 'Ukraine'
 'United Arab Emirates' 'United Kingdom' 'United States' 'Uruguay'
 'Uzbekistan' 'Vanuatu' 'Venezuela, RB' 'Vietnam' 'Virgin Islands (U.S.)'
 'West Bank and Gaza' 'Yemen, Rep.' 'Zambia' 'Zimbabwe']

Total no of unique countries: 217
```

In [10]:
```
print(df['Country Code'].unique())
print("\nTotal no of unique country code:",df['Country Code'].nunique())
```

```
['AFG' 'ALB' 'DZA' 'ASM' 'AND' 'AGO' 'ATG' 'ARG' 'ARM' 'ABW' 'AUS' 'AUT'
 'AZE' 'BHS' 'BHR' 'BGD' 'BRB' 'BLR' 'BEL' 'BLZ' 'BEN' 'BMU' 'BTN' 'BOL'
 'BIH' 'BWA' 'BRA' 'VGB' 'BRN' 'BGR' 'BFA' 'BDI' 'CPV' 'KHM' 'CMR' 'CAN'
 'CYM' 'CAF' 'TCD' 'CHI' 'CHL' 'CHN' 'COL' 'COM' 'COD' 'COG' 'CRI' 'CIV'
 'HRV' 'CUB' 'CUW' 'CYP' 'CZE' 'DNK' 'DJI' 'DMA' 'DOM' 'ECU' 'EGY' 'SLV'
 'GNQ' 'ERI' 'EST' 'SWZ' 'ETH' 'FRO' 'FJI' 'FIN' 'FRA' 'PYF' 'GAB' 'GMB'
 'GEO' 'DEU' 'GHA' 'GIB' 'GRC' 'GRL' 'GRD' 'GUM' 'GTM' 'GIN' 'GNB' 'GUY'
 'HTI' 'HND' 'HKG' 'HUN' 'ISL' 'IND' 'IDN' 'IRN' 'IRQ' 'IRL' 'IMN' 'ISR'
 'ITA' 'JAM' 'JPN' 'JOR' 'KAZ' 'KEN' 'KIR' 'PRK' 'KOR' 'XKX' 'KWT' 'KGZ'
 'LAO' 'LVA' 'LBN' 'LSO' 'LBR' 'LBY' 'LIE' 'LTU' 'LUX' 'MAC' 'MDG' 'MWI'
 'MYS' 'MDV' 'MLI' 'MLT' 'MHL' 'MRT' 'MUS' 'MEX' 'FSM' 'MDA' 'MCO' 'MNG'
 'MNE' 'MAR' 'MOZ' 'MMR' 'NAM' 'NRU' 'NPL' 'NLD' 'NCL' 'NZL' 'NIC' 'NER'
 'NGA' 'MKD' 'MNP' 'NOR' 'OMN' 'PAK' 'PLW' 'PAN' 'PNG' 'PRY' 'PER' 'PHL'
 'POL' 'PRT' 'PRI' 'QAT' 'ROU' 'RUS' 'RWA' 'WSM' 'SMR' 'STP' 'SAU' 'SEN'
 'SRB' 'SYC' 'SLE' 'SGP' 'SXM' 'SVK' 'SVN' 'SLB' 'SOM' 'ZAF' 'SSD' 'ESP'
 'LKA' 'KNA' 'LCA' 'MAF' 'VCT' 'SDN' 'SUR' 'SWE' 'CHE' 'SYR' 'TJK' 'TZA'
 'THA' 'TLS' 'TGO' 'TON' 'TTO' 'TUN' 'TUR' 'TKM' 'TCA' 'TUV' 'UGA' 'UKR'
 'ARE' 'GBR' 'USA' 'URY' 'UZB' 'VUT' 'VEN' 'VNM' 'VIR' 'PSE' 'YEM' 'ZMB'
 'ZWE']

Total no of unique country code: 217
```

In [11]:
```
df['Series Name'].unique()
```

Out[11]:
```
array(['Population, total', 'Population, female', 'Population, male',
       'Population, female (% of total population)',
       'Population, male (% of total population)'], dtype=object)
```

In [12]:
```
df['Series Code'].unique()
```

Out[12]:
```
array(['SP.POP.TOTL', 'SP.POP.TOTL.FE.IN', 'SP.POP.TOTL.MA.IN',
       'SP.POP.TOTL.FE.ZS', 'SP.POP.TOTL.MA.ZS'], dtype=object)
```

Dropping unnecessary columns

In [13]:
```
df.drop(['Series Name','Country Code'],axis=1,inplace=True)
```

In [14]:
```
df.columns
```

Out[14]:
```
Index(['Series Code', 'Country Name', '2022', '2021', '2020', '2019', '2018',
       '2017', '2016', '2015', '2014', '2013', '2012', '2011', '2010', '2009',
       '2008', '2007', '2006', '2005', '2004', '2003', '2002', '2001'],
      dtype='object')
```

Top 10 countries with respect to total population

In [15]:
```
# Filter data for total population
total_population_data = df[df['Series Code'] == 'SP.POP.TOTL']

# Sort data based on the total population for 2022
total_population_sorted = total_population_data.sort_values(by="2022", ascending=False)

# Get the top ten countries with the highest total population for 2022
total_top_ten_countries = total_population_sorted.head(10)
print("Top ten countries of total population\n")
print(total_top_ten_countries[['Country Name']] )
```

```
Top ten countries of total population

          Country Name
89               India
41               China
206      United States
90           Indonesia
149           Pakistan
144            Nigeria
26              Brazil
15           Bangladesh
161  Russian Federation
127              Mexico
```

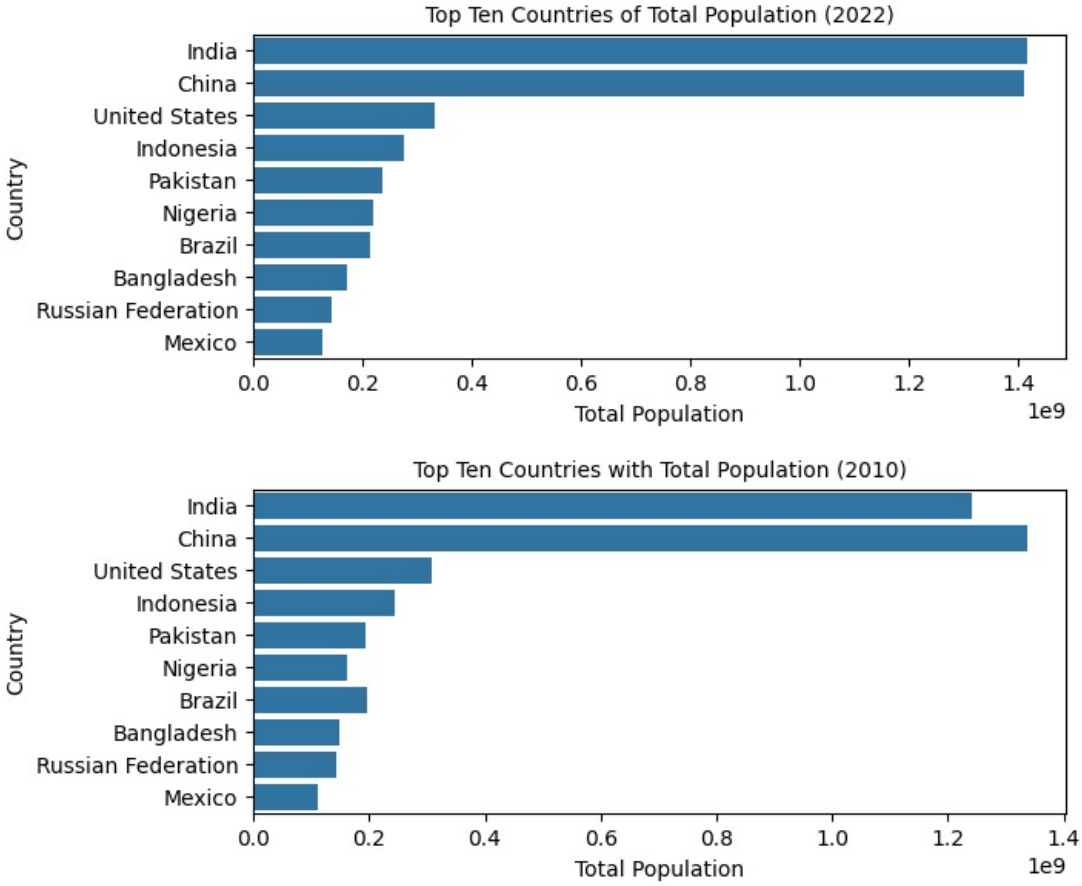
Bar plot

Top 10 countries of total population in 2022 and 2010

In [16]:
```
# Create the bar plot
```

```
plt.figure(figsize=(15, 6))
plt.subplot(2,2,1)
sns.barplot(x="2022", y="Country Name", data=total_top_ten_countries)
plt.title("Top Ten Countries of Total Population (2022)",fontsize=10)
plt.xlabel("Total Population",fontsize=10)
plt.ylabel("Country",fontsize=10)
plt.show()

plt.figure(figsize=(15, 6))
plt.subplot(2,2,2)
sns.barplot(x="2010", y="Country Name", data=total_top_ten_countries)
plt.title("Top Ten Countries with Total Population (2010)",fontsize=10)
plt.xlabel("Total Population",fontsize=10)
plt.ylabel("Country",fontsize=10)
plt.show()
```



Top 10 countries with highest male population

In [17]:
```
# Filter data for male population
male_population_data = df[df["Series Code"] == "SP.POP.TOTL.MA.IN"]

# Sort data based on the male population for 2022
male_population_sorted = male_population_data.sort_values(by="2022", ascending=False)

# Get the top ten countries with the highest male population for 2022
male_top_ten_countries = male_population_sorted.head(10)
print("Top ten countries of male population")
print(male_top_ten_countries[['Country Name']] )
```

```
Top ten countries of male population
          Country Name
523              India
475              China
640      United States
524          Indonesia
583           Pakistan
578            Nigeria
460             Brazil
449         Bangladesh
595  Russian Federation
561             Mexico
```

Top 10 countries with highest female population

In [18]:
```
# Filter data for female population
female_population_data = df[df["Series Code"] == "SP.POP.TOTL.FE.IN"]

# Sort data based on the female population for 2022
female_population_sorted = female_population_data.sort_values(by="2022", ascending=False)

# Get the top ten countries with the highest female population for 2022
female_top_ten_countries = female_population_sorted.head(10)
print("Top ten countries of female population")
print(female_top_ten_countries[['Country Name']] )
```

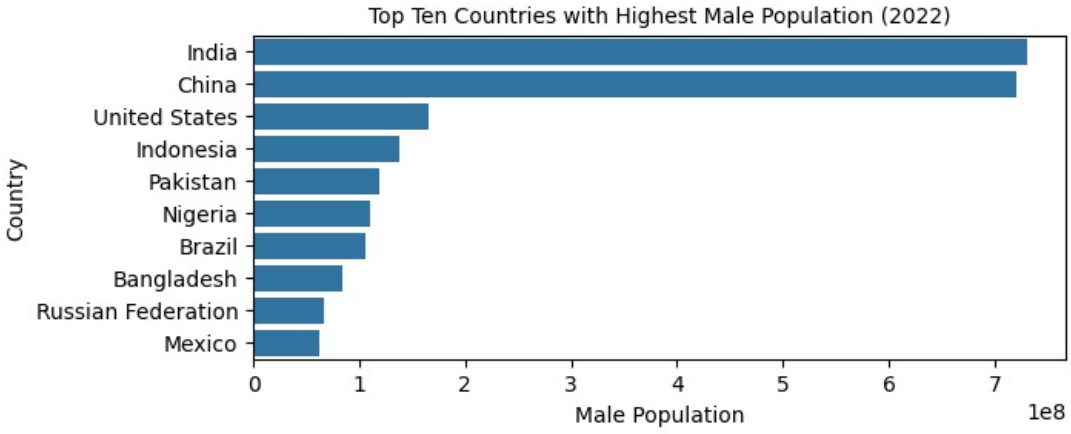
```
Top ten countries of female population
          Country Name
258              China
306              India
423      United States
307          Indonesia
366           Pakistan
243             Brazil
361            Nigeria
232         Bangladesh
378  Russian Federation
344             Mexico
```

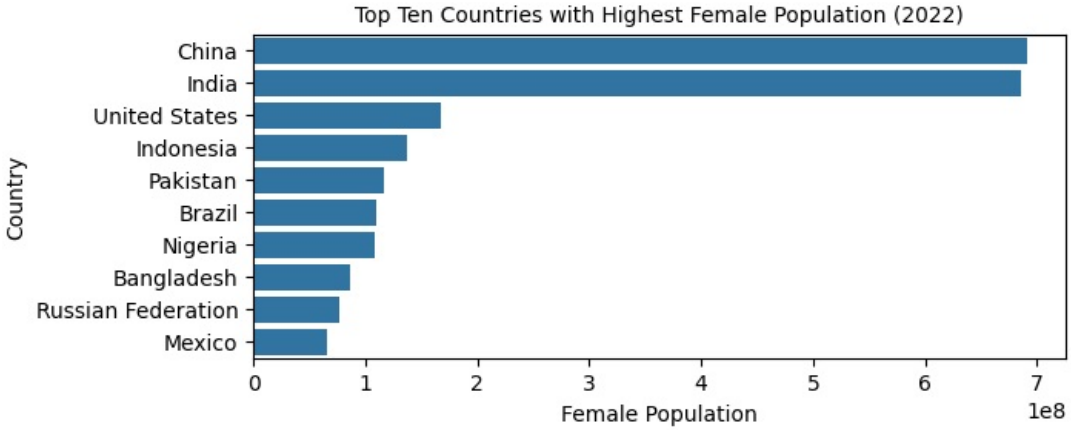
Bar plotting

Top 10 countries with highest male and female population in year 2022

In [19]:
```
# Create the bar plot
plt.figure(figsize=(15, 6))
plt.subplot(2,2,1)
sns.barplot(x="2022", y="Country Name", data=male_top_ten_countries)
plt.title("Top Ten Countries with Highest Male Population (2022)",size=10)
plt.xlabel("Male Population",size=10)
plt.ylabel("Country",size=10)
plt.show()

plt.figure(figsize=(15, 6))
plt.subplot(2,2,2)
sns.barplot(x="2022", y="Country Name", data=female_top_ten_countries)
plt.title("Top Ten Countries with Highest Female Population (2022)",size=10)
plt.xlabel("Female Population",size=10)
plt.ylabel("Country",size=10)
plt.show()
```





Stacked bar plot

Top 10 countries with male and female population in year 2022

In [20]:
```
# Merge male and female population data on 'Country Name'
merged_data = pd.merge(male_population_data, female_population_data, on="Country Name", suffixes=("_male", "_fe
```

In [21]:
```
merged_data
```

Out[21]:

	Series Code_male	Country Name	2022_male	2021_male	2020_male	2019_male	2018_male	2017_male	2016_male	2015_r
0	SP.POP.TOTL.MA.IN	Afghanistan	20766442.0	20254878.0	19692301.0	19090409.0	18549862.0	18028696.0	17520861.0	170714
1	SP.POP.TOTL.MA.IN	Albania	1384548.0	1404454.0	1419264.0	1428828.0	1435881.0	1440219.0	1442176.0	14448
2	SP.POP.TOTL.MA.IN	Algeria	22862237.0	22497244.0	22132899.0	21756903.0	21362603.0	20961313.0	20556314.0	201522
3	SP.POP.TOTL.MA.IN	American Samoa	21873.0	22289.0	22921.0	23535.0	24134.0	24701.0	25240.0	257
4	SP.POP.TOTL.MA.IN	Andorra	40786.0	40361.0	39615.0	38842.0	38071.0	37380.0	36628.0	361
...	...	...	...	...	...	...	...	...	...	...
212	SP.POP.TOTL.MA.IN	Virgin Islands (U.S.)	49137.0	49510.0	49866.0	50196.0	50489.0	50759.0	50999.0	512
213	SP.POP.TOTL.MA.IN	West Bank and Gaza	2516444.0	2455361.0	2394860.0	2334948.0	2275925.0	2217868.0	2173706.0	21256
214	SP.POP.TOTL.MA.IN	Yemen, Rep.	17023203.0	16668432.0	16320979.0	15953578.0	15578957.0	15202496.0	14820156.0	144391
215	SP.POP.TOTL.MA.IN	Zambia	9877642.0	9609004.0	9338613.0	9066397.0	8794716.0	8525934.0	8260471.0	80003
216	SP.POP.TOTL.MA.IN	Zimbabwe	7705601.0	7543690.0	7385220.0	7231989.0	7086002.0	6940631.0	6796658.0	66528

217 rows × 47 columns

In [22]:
```
# Calculate the total population for each country (male + female)
merged_data["Total Population"] = merged_data["2022_male"] + merged_data["2022_female"]
```

In [23]:
```
merged_data.head()
```

Out[23]:

	Series Code_male	Country Name	2022_male	2021_male	2020_male	2019_male	2018_male	2017_male	2016_male	2015_ma
0	SP.POP.TOTL.MA.IN	Afghanistan	20766442.0	20254878.0	19692301.0	19090409.0	18549862.0	18028696.0	17520861.0	17071446
1	SP.POP.TOTL.MA.IN	Albania	1384548.0	1404454.0	1419264.0	1428828.0	1435881.0	1440219.0	1442176.0	1444890
2	SP.POP.TOTL.MA.IN	Algeria	22862237.0	22497244.0	22132899.0	21756903.0	21362603.0	20961313.0	20556314.0	20152232
3	SP.POP.TOTL.MA.IN	American Samoa	21873.0	22289.0	22921.0	23535.0	24134.0	24701.0	25240.0	25739
4	SP.POP.TOTL.MA.IN	Andorra	40786.0	40361.0	39615.0	38842.0	38071.0	37380.0	36628.0	36188

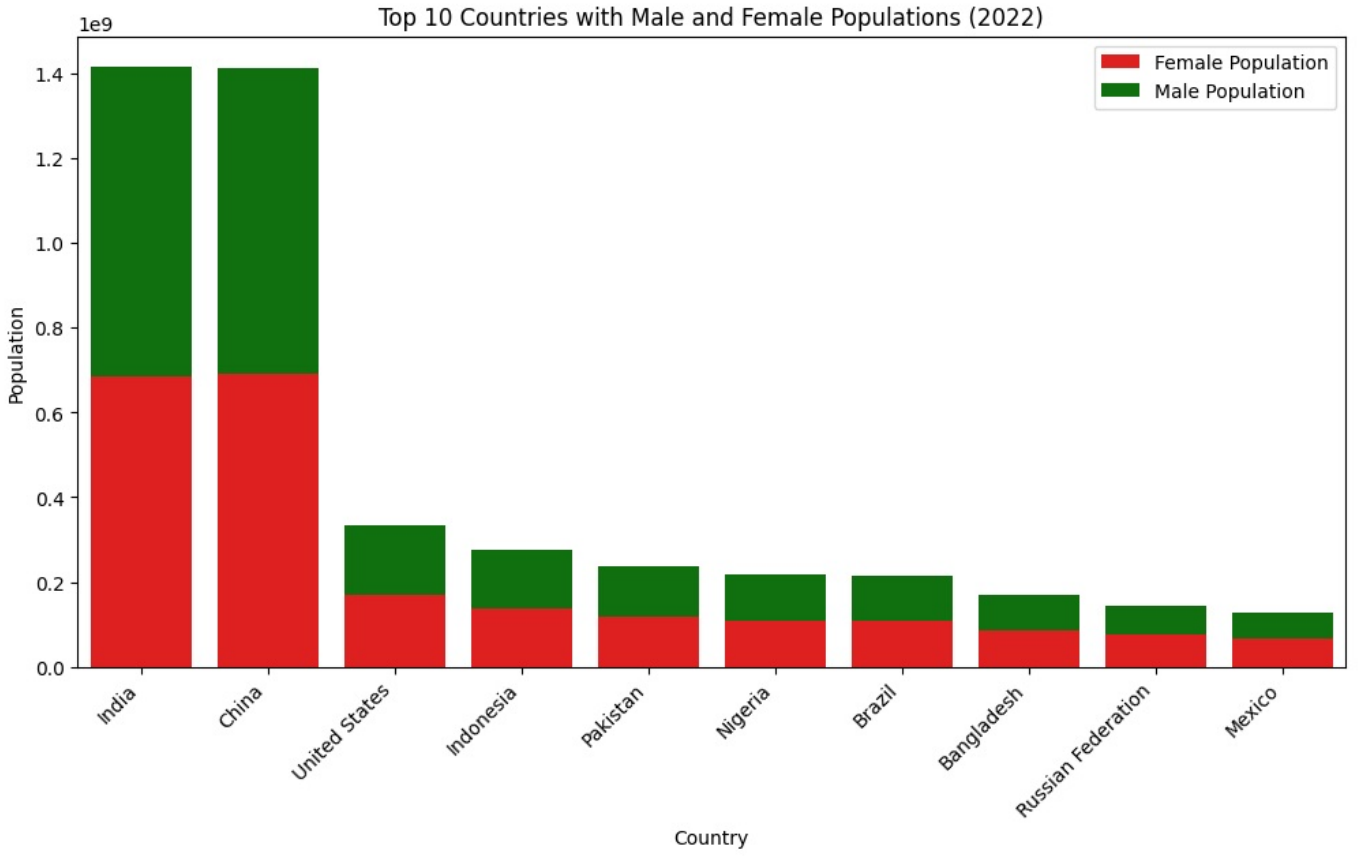
5 rows × 48 columns

In [24]:
```
# Sort data based on total population in descending order
sorted_data = merged_data.sort_values(by="Total Population", ascending=False)

# Select the top 10 countries with the highest total population
top_10_countries = sorted_data.head(10)
```

In [25]:
```
# Create the stacked bar plot
plt.figure(figsize=(12, 6))

sns.barplot(x="Country Name", y="2022_female", data=top_10_countries, color="red", label="Female Population")
sns.barplot(x="Country Name", y="2022_male", data=top_10_countries, bottom=top_10_countries["2022_female"], col
plt.title("Top 10 Countries with Male and Female Populations (2022)")
plt.xlabel("Country")
plt.ylabel("Population")
plt.legend()
plt.xticks(rotation=45, ha="right")
plt.show()
```



In [ ]: